Original Research Article

Does the Dietary Diversity Score of Public Distribution System Beneficiaries Differ from Non-beneficiaries in Rural and Urban Telangana? A Comparative Study

ABSTRACT

The present study has assessed the dietary diversity score and the factors influencing dietary diversity of Pubic Distribution System beneficiary and non-beneficiary households in rural and urban areas of Telangana state. Multistage purposive random sampling was used for the selection of three districts, six mandals and 12 each village and urban areas for conducting the study with a total sample of 480 households. The primary data collected through pre-tested interview schedules were analysed using Simpson Index Dietary Diversity (SIDD) score and later multiple linear regression was used to regress socio-economic and demographic variables to assess the influence of these variables on SIDD score. The results revealed that the overall dietary diversity score for rural and urban PDS beneficiaries was 0.86 whereas for rural and urban PDS non-beneficiary households' SIDD score was 0.82 and 0.83 respectively. The results clearly showed that PDS beneficiary households had higher dietary diversity than non-beneficiaries' households. Age, household size, education, farmland and livestock possession enhanced dietary diversity, thereby improving the nutritional status of households.

Keywords: Public distribution system, beneficiary, dietary diversity, food security.

1. INTRODUCTION

Ensuring an adequate food supply is a significant issue for several Asian nations, notably India, which is projected to surpass China in population by 2030. India, representing

approximately 17.53 percent of the global population, is expected to reach over 1.53 billion people by the end of 2030. The country's population growth rate stands at 1.58 percent[1]. The challenge of undernourishment and malnutrition has persistently impeded the progress of many developing nations, aligning with the United Nations' Sustainable Development Goals (SDGs) [2].

Dietary habits wield considerable influence over human well-being, both mentally and physically. A well-rounded diet is crucial for maintaining good health. Dietary patterns play a pivotal role in determining the quality of life and nutritional security, particularly as changing dietary preferences have led to a heightened demand for fruits, vegetables, dairy, meat, poultry, and fisheries. This necessitates crop diversification to meet evolving nutritional needs and food demands.The diversity of diets, encompassing a variety of foods or food groups, correlates with increased energy and nutrient intake [3].Therefore, evaluating dietary diversity, defined as the array of different food items within a household's food basket, is essential for measuring diet quality and assessing how well households meet their nutritional requirements [4].Analyzing dietary patterns aids in understanding household food and nutritional security status [5,6]. Various factors, such as production diversity [7], household income, expenditure levels, and demographic and socioeconomic characteristics, contribute to the dietary diversity of a region's inhabitants [8].

Changes in per capita household income and food commodity prices significantly impact the composition of food consumption. To achieve food security and ensure proper nourishment, understanding the constituents of a healthy diet and making informed food choices is imperative.While Public Distribution Systems (PDS) have alleviated hunger, their impact on nutritional aspects remains unclear. Recent studies suggest that increased PDS coverage not only raises calorie intake but also enhances dietary diversity, largely due to income effects [9,10,11,12]. PDS implementation may also lead to the substitution of more

nutritious coarse cereals and millets for PDS-subsidized wheat [13]. Formulating effective policies and interventions to enhance nutritional security requires an understanding of these factors, their interrelationships, and their relevance to specific demographic groups. Thus, this paper aims to investigate the dietary diversity of households in Telangana state, with the objective of analyzing the factors influencing their dietary patterns.

2. MATERIAL AND METHODS

Primary data have been employed in this study. The data consisted of general characteristics about the household size, age, gender, education, monthly income, monthly expenditure menu and quantity of the food prepared, food habits, livestock, and other variables were recorded based on seven days recall method for both rural and urban areas of Telangana during September 2022 to January 2023.

2.1 Sampling Design and Method of Data Collection

The study majorly relied on primary data collected through well-structured and pre-tested personal interviews. The multi-stage random sampling approach was used to gather the data.Telangana state is divided into three zones namely Northern Telangana zone, Central Telangana zone and Southern Telangana zone. At the first stage, one district from each zone having highest beneficiaries will be selected purposively. In the next stage two mandals (one with highest number of beneficiaries and other with lowest number of beneficiaries) from the selected district will be selected purposively. Later a sample of rural and urban areas will be identified and two villages and two urban areas from each mandal will be selected.Finally, to select ten households (beneficiaries and poor non-beneficiaries of PDS) from each of the selected areas. Thus,the sample include 240 rural (120 beneficiaries and 120 non-beneficiaries of PDS) and 240 urban (120 beneficiaries and 120 non-beneficiaries of PDS) comprising a total sample of 480 households.

2.2 Simpson index of dietary diversity

The Simpson Index of Dietary Diversity (SIDD) was developed to evaluate the diversity of food consumption within households.Initially proposed by Edward Simpson in 1949 for measuring species diversity[14], Orris C. Herfindahl later adapted and modified the index for economic research in 1950[15]. Several studies by Katanoda et al. [16] and Shinoj et al. [17]have explored dietary diversity, as documented by Joshi et al.[18].

In this study, the Simpson Index of Dietary Diversity (SIDD) technique was employed to assess the diversity in the consumption baskets of respondents. The Food and Agricultural Organization (FAO) categorized food into 12 groups in 2013, and this research considers all ten groups to calculate the Simpson Index of Dietary Diversity (SIDD). These ten food groups comprise cereals, tubers and roots, fruits, sugar, meat, eggs, pulses, vegetables, oils, and milk and its products excluding the consumption of two food groups (beverages and processed foods). The assessment involved calculating the diversity in terms of the number and distribution of various food items within the households' consumption baskets. Consequently, dietary diversity is determined as follows:

$$SIDD = 1 - \sum_{i=1}^{n} P_i^2$$

Where, SIDD = Simpson Index of dietary diversity,

Pi = proportion of the ith food item in total monthly consumption food items by members of the household.

The index has a range of 0 to 1, and its maximum value approaches 1 as the number of food items (n) increases. If it is zero, it signifies that the individual consumes very few food items. SIDD scores were collected for households of different income levels for comparison.

A multiple linear regression model was utilized to further explain the variation in diversity scores across various groups of households and to correlate their variation to PDS household dietary diversity, and socioeconomic and demographic characteristics.

$$SIDD_i = \alpha_0 + \alpha_1 Z_i + \alpha_2 E_i + \alpha_3 O_i + u_i$$

Where,

SIDDi - Dietary diversity score is indicated by dependent variables (ranges 0 to 1)

α_0 = intercept

α_1, α_2 and α_3 coefficients of independent variables

Zi - Vector based on sociological and demographic characteristics like age (Years), gender (Male=1, Female= 0), education (Illiterate-0, Primary-1, secondary-2, Higher secondary-3 and Graduate-4), household size (Numbers).

Ei - Vector of the economic status of households like monthly income and monthly expenditure (Rs/ Month).

Oi - Vector of household ownership like Farmland (acres) and livestock (Numbers) and

ui - Error term

3. RESULTS AND DISCUSSION

3.1 Household primary survey of dietary diversity in rural and urban areas

Dietary diversity is essential for diet nutrient adequacy and individual dietary status. The dietary diversity of beneficiary and no-beneficiary households of Public Distribution System is analysed and presented in Table.1

Table.1 Simpson Index of Dietary Diversity (SIDD)

Area	Type of respondent	SIDD
Rural	Beneficiary	0.86
	Non-beneficiary	0.82
Urban	Beneficiary	0.86
	Non-beneficiary	0.83

From the results in Table.1 show that the variety of food items consumed by households in urban areas was slightly greater than rural areas. The SIDD value of food items was similar in case of beneficiaries in rural and urban areas with SIDD score of 0.86, the difference was observed with respect to poor non-beneficiaries, where urban non-beneficiaries exhibited slightly higher SIDD score (0.83) over rural non-beneficiaries (0.82).

The beneficiary household group consumes a wider range of food products than their counterparts (i.e., non-beneficiary) groups in both rural and urban areas. However, urban households consume a wider range of food items and have greater access to buy a wider range of food items, which could be attributed to easy and reliable market accessibility as well as the households having a high and consistent income[19].

3.2 Factors influencing the dietary diversity of households in rural and urban areas

To examine the impact of various factors on dietary diversity, the SIDD score was used as the dependent variable, and socio-demographic, asset ownership, and economic factors were used as the independent variables. Table 2 and Table 3 shows the parametric estimates of dietary diversity for rural beneficiary and non-beneficiary households of PDS and Table 4 and Table 5 shows the urban beneficiary and non-beneficiary households of PDS respectively using a multiple linear regression model

Table.2 Factors influencing the dietary diversity of beneficiary households in rural areas

Particulars	Coefficients	Standard Error	t Stat	P-value
Intercept	0.861814***	0.012831	67.16421	1.6E-90
Age	0.00027**	0.000122	2.21938	0.028532
Education	-0.0009	0.001096	-0.82073	0.413589
Familysize	0.000709	0.001375	0.515418	0.607305
Landholding	0.00052	0.000448	1.161455	0.247994
Gender	0.000221	0.004781	0.046246	0.963199
Food expenditure	5.45E-07	8.26E-07	0.660284	0.510465
Monthly household income	1.8E-07	1.82E-07	0.989829	0.32445
Livestock	0.000587*	0.000309	1.902109	0.059796
Per capita Kilo calorie	7.71E-07	4.39E-06	0.175454	0.861048

Note: ***, ** and * indicates significance level at 1%, 5% and 10 % respectively

Table.3 Factors influencing the dietary diversity of non-beneficiary households in rural areas

Particulars	Coefficients	Standard Error	t Stat	P-value
Intercept	0.866885***	0.024828	34.9153	5.3E-61
Age	0.000361*	0.00021	1.718577	0.088531
Education	0.002806	0.002304	1.217538	0.226029

Familysize	-0.0034	0.002671	-1.27307	0.205702
Landholding	0.00161*	0.000869	1.853369	0.066534
Gender	-0.00349	0.00582	-0.60027	0.54957
Food expenditure	-2.6E-06	4.13E-06	-0.63499	0.526768
Monthly household income	-2.4E-07	2.53E-07	-0.95905	0.339658
Livestock	0.001408	0.001586	0.888161	0.37641
Per capita Kilo calorie	-7.5E-06	7.29E-06	-1.03418	0.303341

Note: *** and * indicates significance level at 1% and 10 % respectively

The results from Table 2 and Table 3 revealed that the age of the household head was statistically significant at five and ten per cent level for beneficiary and non-beneficiary groups respectively, indicating that they have better knowledge of different foodgroups as well as the nutritional content of an active healthy life. At ten percent level, livestock possession was significant for rural beneficiary households whereas for rural non-beneficiary households, owning of farmland was significant at ten per cent level. The gender, family size, and education level of the household head were found to be insignificant, with no effect on the dietary diversity of the household.

In rural areas, as the major occupation of respondents is farming and livestock rearing, the major parameters influencing the dietary diversity are owning of farmland and livestock. In rural beneficiary group, increasing animal milking by one unit would significantly raise the SIDD score by 0.0005 and in case of non-beneficiary group, increase in land holding by one acre significantly raise the SIDD score by 0.002. The results are in line with a similar study conducted by Khed and Sravankumar[20] where age and ownership of livestock were significantly influencing the SIDD score and other study by Nithyavathiet al.[19] where the farm size influencing SIDD score positively in rural areas.

Table.4 Factors influencing the dietary diversity of beneficiary households in urban areas

Particulars	Coefficients	Standard Error	t Stat	P-value
Intercept	0.845632***	0.014343	58.9578	1.62E-84
Age	0.00026**	0.000117	2.18883	0.030742
Education	-0.00095	0.000844	-1.12806	0.261772

Familysize	0.000318	0.001314	0.241816	0.809377
Landholding	6.85E-05	0.000472	0.144996	0.884982
Gender	0.011067	0.007433	1.488841	0.139417
Food expenditure	5.93E-07	5.69E-07	1.042444	0.299512
Monthly household income	1.03E-07	1.22E-07	0.848419	0.398064
Livestock	-0.00028	0.000191	-1.45839	0.147609
Per capita Kilo calorie	3.83E-06	3.94E-06	0.970801	0.333797

Note: *** and ** indicates significance level at 1% and 5% respectively

Table.5 Factors influencing the dietary diversity of non-beneficiary households in urban areas

Particulars	Coefficients	Standard Error	t Stat	P-value
Intercept	0.827868***	0.016836	49.17131	3.1E-76
Age	-0.00013	0.000182	-0.70757	0.480725
Education	0.00328**	0.001635	2.00345	0.04761
Familysize	0.008307***	0.002453	3.386735	0.000985
Landholding	-0.0003	0.000769	-0.39326	0.694897
Gender	-0.00207	0.006065	-0.34076	0.733941
Food expenditure	-1.2E-06	1.36E-06	-0.85026	0.397042
Monthly household income	1.08E-07	2.26E-07	0.478623	0.633165
Livestock	0.00183	0.001278	1.431989	0.155008
Per capita Kilo calorie	1.14E-05**	5.56E-06	2.046016	0.043162

Note: *** and ** indicates significance level at 1% and 5% respectively

Similarly, for urban PDS beneficiaries and non-beneficiaries' households could be seen from Table 4 and Table 5 results of the SIDD index variables. In case of urban beneficiary households, the variable, age of the household head alone shown significant relationship with SIDD score at five per cent level, that a unit increase in age raise the SIDD score by 0.00026. whereas for urban non-beneficiary households, the coefficient of independent variables like the education of the household head (0.003), family size of the household(0.008) and per capita Kilo calorieintake (1.14E-05) were significantlypositively related.

The age of the headed household was statistically significant which indicates that have better knowledge of different food groups and also the nutritional content of active healthy life.Age and education were the mostimportant factors which were significantly contributed to improve the householdnutritional security through experience, better knowledge on different nutritious dietsand health [21,17]. However, a similar result was

found in the study conducted by Sibhatuet al.[7]. The household size was highly significant at the one percent level that determines the dietary diversity of the households in urban areas where more the earning members in the family, high is the consumption expenditure for obtaining diversified nutritious foods and hence increase the nutritional security of the households.

4. CONCLUSION

The results clearly show that SIDDscores of PDS beneficiaries in rural and urban areas were greater than their counterparts, non-beneficiaries. This is similar to the results revealed by a study where access to PDS had positive and statistically significant impact for rural and urban categories of households that had more access to subsidised foods under PDS system that enabled the households to make more budgetary savings, through which they can spent on additional food items [20].As the knowledge from the above results pertaining to factors influencing the SIDD, to strengthen the dietary diversity scores of the population, the active engagement of PDS is essential. This involvement aiming to supply the subsidised diverse food commodities including nutritious food items such as jowar, bajra, ragi, pulses, sugar and fine rice. The objective is to reduce current expenditures on food, allowing the reallocation of saved resources toward entrepreneurial activities like acquiring farmland, livestock and backyard poultry that enhance capacity for self-produced food consumption and aiming at selfsustained living standards of the households as a futuristic goal. This approach, coupled with educational initiatives to family members, particularly children, has the potential to cultivate diversified and higher-paying opportunities, ultimately contributing to the enhancement in food and nutritional security.

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